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he succeeded quite as well as some college juniors I have seen. And when, in after years, the time came for him to take up the study of botany more systematically, the objects of his study were to him not dim and unreal phantoms, but familiar friends.

To be continued.

FIGURING AGAINST WEEDS.

BY BYRON D. HALSTEAD.

THE weeds are among the worst enemies of the farmer. They cause a loss of many millions of dollars annually to the State of Iowa. This is not only in the diminution of crops but no small share of the outgo is in labor in order to prevent an entire loss of the crop.

Some persons, who as yet have secured no world-wide reputation for keen common sense, are inclined to look with much favor upon weeds. To their visionary minds they are simply a proper stimulus for the profitable tillage of the soil, and therefore may be considered as the friend instead of the enemy of the progressive farmer. If it were not for the weeds, which spring up and choke the neglected crop, there would not be sufficient incentive to good husbandry. Good and poor farming would be more equally rewarded. The man who hoes and the one who leaves his corn field for the shade and game along the wooded stream would stand a common chance of plenty at the harvest time. In short, weeds are the appointed means of putting a premium upon farm industry and furnish one reason why it does not pay to be shiftless.

This is turning the curse into a blessing, and if every one would practically make this turn there would need to be but little more said.

Weeds are a good deal like the sun and the rain in relation to the just and the unjust, with perhaps this variation, that the weeds seed abundantly on the neglected land of a shiftless farmer and these same seeds find their best places for growth in the clean rich fields of the careful husbandman.

But all this aside; it is true that the State of Iowa has already more weeds than she wants for the purpose of premiums. Her good farmers get enough encouragement for being good without having their less prosperous neighbors loaded down with a heavy weight of thieving weeds. I for one would be willing to risk the quality of Iowa agriculture if every vile weed within our borders was rooted out and all their seeds burned to smoke and ashes.

The conditions which surround our prairie farming, foster the growth of weeds. Land has been very cheap and at the same time very rich. The first fact has encouraged a spirit of carelessness on the part of the farmer and the second has permitted the rapid multiplication of rank weeds. As a result our State is becoming almost overrun with plant-pests of both the field and the garden.

The time has come when an earnest study must be made of the weeds which rob our land, already losing much of its virgin fertility. We must come to the rescue while the enemy is comparatively weak. Education is more effective than legislation. It is not difficult, perhaps, to pass a law against cockle-bur, beggar's lice, Canada thistle, etc., as has been done in many States, but an act of the legislature does little good until there is a keen appreciation of the importance of clean fields and road sides, already in the minds of the farmers.

With a view to becoming better acquainted with the weeds and useless plants of the State, a list has been prepared which embraces: (1) all the worst weeds, (2) the bad weeds, and (3) the indifferent weeds. The first class includes fifty-one (51). In the second group are ninety-four (94) kinds; and among the indifferent sorts are one hundred and fifty-two (152) species. This gives a total of two hundred and ninety-seven (297) distinct kinds of plants of no great usefulness to the farmers of the State, half of these a positive disadvantage and over half a hundred being pests of the worst sort. When thus arranged the enemy makes a long and bold front.

If we look at these enemies in the light of their term of life—as the horseman would say, look in the mouth, it is found that eighty-four (84) are annuals; twenty-seven (27) are able to live two years at the most, while one hundred and eighty-six (186) are perennial, that is, thrive for an indefinite term of years. These figures can be readily thrown into a tabulated form suitable for the blackboard, thus:—

	Annuals.	Biennials.	Perennials.	Total.
Worst weeds.....	28	6	17	51
Bad weeds.....	34	12	48	94
Indifferent weeds.....	22	9	121	152
	—	—	—	—
Totals.....	84	27	186	297

If we look up the pedigree of these pests it will be found that they are divided into eighty-seven (87) foreigners, which have come from abroad to infest American soil. The large balance of two hundred and ten (210) are natives and are weeds in their wild state or have made inroads upon cultivated land. Of the 87 foreigners, forty-four are annuals, that is, running through their whole life in a single season, twelve (12) are biennials, and thirty-one (31) are perennials. Twenty-eight of the eighty-four are in the worst class, thirty-seven in the bad group, and twenty-two belong to the indifferent order. A table of the imported species may be constructed as follows:—

	Worst.	Bad.	Indifferent.	Total.
Annuals	18	19	7	44
Biennials.....	3	6	3	12
Perennials.....	7	12	12	31
	—	—	—	—
Totals.....	28	37	22	87

Taking up the 210 native species in the same way, the table stands as follows:—

	Worst.	Bad.	Indifferent.	Total.
Annuals	10	16	14	40
Biennials.....	3	6	6	15
Perennials.....	10	35	110	155
	—	—	—	—
Totals.....	23	57	130	210

From these tables it will be seen that of the worst class—which of course most interests us, there are twenty-eight foreigners to twenty-three native species. It is no comfort to know that more than half of our most aggressive weeds have come, or been brought, to us from some other country. If there is any satisfaction in the thought, it may be here stated that some inoffensive American plants have gone abroad and became dreadful pests in their new surrounding. In this way we compensate in part for the additions made to our list of weeds from European and other lands.

Beginning with the foreign annuals the leading worst kinds given in the order of arrangement in Gray's Botany, are : charlock or yellow mustard, shepherd's purse, corn cockle, purslane, abutelon or velvet leaf, sun-flower, mayweed, Jamestown or jimson-weed, two species, goose-foot or lamb's quarters ; pig-weed, tumble-weed, chess and three kinds of fox-tail grass or "puss-tail."

The three foreign biennials are the common carrot, parsnip and the hound's-tongue. Two of these are closely related and have escaped from the vegetable garden where they are very important root crops. The carrot and parsnip are not as bad weeds in Iowa as they have become in many parts of the East where they cover the pastures and meadows with useless herbage.

Of foreign perennials the leading worst sorts are Canada thistle, dandelion, rib-grass or narrow-leaved plantain, butter and eggs, toad-flax or ramstead weed, curled-dock and sorrel.

Coming now to the native weeds of this most injurious class we find among the annuals the following : Daisy fleabane, great rag-weed, Roman rag-weed, cockle-bur or clot-bur, beggar's ticks, horse nettle, beaked horse nettle, prostrate pig-weed, knot-grass and bur-grass. It will be seen at a glance that this is a formidable array of bad enemies.

The biennials are the evening primrose, a kind of fleabane or horse-weed, and the viper's bugloss or sometimes called blue devils. This makes a strong three-horse team.

Of the native perennials may be mentioned the callirrhoeä, two kinds of iron-weed, three sorts of thistles, namely : the ball thistle, common thistle and pasture thistle, the bracted bind-weed and quack or quick-grass.

By turning the figures of the tables to further service, it may be shown that there are nearly twice as many foreign weeds of the worst sort as of the natives. Twenty-eight out of the fifty-one live for only a single year. Six only are biennials and seventeen are perennials. This we should not expect because other things remaining the same a perennial is a worse weed than an annual. But other things do not remain the same. The annual is usually characterized by great capacity for forming seed, and this advances many of the annuals to the first rank among plant pests. For example, the common purslane will mature a million seeds in a

single season or enough to thoroughly stock a country with this pest. A student made a careful estimate of the seeding capacity of a single plant of the small veronica, called niclace speedwell, and found that the number of seeds was 186,292. These figures help to force home the thought that weeds, and especially these sorts which are dependent upon seeds for their continuation, are exceedingly prolific, and also the importance of keeping such pests from maturing their offspring.

When asked to select the most offensive among the worst weeds the task becomes an exceedingly difficult one. Among the annuals, especially in gardens, the purslane or "pusley" perhaps takes the lead. In striking contrast with the prostrate purslane is the shrub-like Jamestown weed or stramoniums, sometimes called jimson weed. The rank herbage and heavy order of these coarse weeds, as well as their larger size, make them conspicuous and disagreeable. The pig-weeds and the closely related tumble-weed are common coarse intruders into the tilled ground.

Of the biennial the most to be dreaded are the carrot and the fleabane, both of which, in their own widely different way, can do much to render the life of the farmer vexatious.

The worst foreign perennial, at least the one with the most meanness in its make up, is the Canadathistle. At present it is but little known in many parts of the State; but it spreads rapidly by means of its airy floats which bear the light seed for long distances, and when once established in the soil it holds its place with an almost undying grip. The long perennial roots strike Iowa deep into the soil while the prickly herbage defies the attacks of foraging animals. The curled-leaf dock also takes a firm hold and is eradicated only by being dug up by the roots and hung in the sun or burned. Of the native perennials there are various sorts of coarse thistles and the celebrated quack or quick-grass. This last is a remarkable instance of propagation by undergrown stems. Plowing and harrowing only aids in the spread of this pest. Each piece of wiry stem when given any sort of a chance will grow and develop the weed.

As a rule the weeds of all classes should never be permitted to mature their seed. With annuals this is a quick and effective means of eradication. The biennials will perish at the end of the

second year. Perennials may live on for several years but if they are not allowed to develop much herbage and no flowers the old plants will gradually die of starvation and, being without heirs, they will leave the land to revert to its rightful owners.

Proper tillage will keep the weeds within safe bounds in the open fields of hoed crops. By proper tillage is understood that culture which the crop demands even when no weeds encumber the soil. The hot-bed for weeds is the neglected corners where the cultivator and hoe do not naturally go. It is in such places, along road-sides, barn-yards, open wood lots and fence corners that weeds sneak in and bear their young. It will be difficult to keep the cultivated field clean when all around is breeding ground for foul seeds.

Rome was not built in a day and neither will our weeds be destroyed in a generation. It is only hoped that, as all roads lead to Rome, so may all the inward desires and open acts of every producer of crops tend toward the destruction of our worst weeds.

THE CENTRAL PHILIPPINES.

BY J. B. STEERE.

(Concluded from page 626.)

AFTER much enquiry for a suitable place to collect in, we heard of virgin forest in the north part of the island of Panay, and finding a little steamer running up the coast we took passage to the village of Concepcion, some twenty miles north of Ilo Ilo, and nearly in front of the curious conical island called Pau de Assucar. Woods were in sight, but we found that they were steep and rocky, and difficult to hunt in, and rather unproductive of forms new to our collections, most of the birds being identical with those already procured in Guimaras. The forest had a curious half-dead appearance, which was due in part to most of the leaves having already, in January, fallen, preparatory to the coming spring, and in part to much of the timber having been injured by large gashes in the trunks to collect the gums from them. Before we left the place some of the trees were already showing the purple and bright yel-